

necessary, the applicant must take design precautions to prevent incorrect configuration of the system.

(g) The sensors, together with associated wiring and signal conditioning, must be segregated, electrically and physically, to the extent necessary to ensure that the probability of a fault propagating from instrumentation and monitoring functions to control functions, or vice versa, is consistent with the failure effect of the fault.

(h) The applicant must provide instrumentation enabling the flight crew to monitor the functioning of the turbine cooling system unless appropriate inspections are published in the relevant manuals and evidence shows that:

(1) Other existing instrumentation provides adequate warning of failure or impending failure;

(2) Failure of the cooling system would not lead to hazardous engine effects before detection; or

(3) The probability of failure of the cooling system is extremely remote.

[Amdt. 33-5, 39 FR 1831, Jan. 15, 1974, as amended by Amdt. 33-6, 39 FR 35465, Oct. 1, 1974; Amdt. 33-18, 61 FR 31328, June 19, 1996; Amdt. 33-25, 73 FR 48123, Aug. 18, 2008; Amdt. 33-26, 73 FR 48285, Aug. 19, 2008]

Subpart C—Design and Construction; Reciprocating Aircraft Engines

§ 33.31 Applicability.

This subpart prescribes additional design and construction requirements for reciprocating aircraft engines.

§ 33.33 Vibration.

The engine must be designed and constructed to function throughout its normal operating range of crankshaft rotational speeds and engine powers without inducing excessive stress in any of the engine parts because of vibration and without imparting excessive vibration forces to the aircraft structure.

§ 33.34 Turbocharger rotors.

Each turbocharger case must be designed and constructed to be able to contain fragments of a compressor or turbine that fails at the highest speed

that is obtainable with normal speed control devices inoperative.

[Amdt. 33-22, 72 FR 50860, Sept. 4, 2007]

§ 33.35 Fuel and induction system.

(a) The fuel system of the engine must be designed and constructed to supply an appropriate mixture of fuel to the cylinders throughout the complete operating range of the engine under all flight and atmospheric conditions.

(b) The intake passages of the engine through which air or fuel in combination with air passes for combustion purposes must be designed and constructed to minimize the danger of ice accretion in those passages. The engine must be designed and constructed to permit the use of a means for ice prevention.

(c) The type and degree of fuel filtering necessary for protection of the engine fuel system against foreign particles in the fuel must be specified. The applicant must show that foreign particles passing through the prescribed filtering means will not critically impair engine fuel system functioning.

(d) Each passage in the induction system that conducts a mixture of fuel and air must be self-draining, to prevent a liquid lock in the cylinders, in all attitudes that the applicant establishes as those the engine can have when the aircraft in which it is installed is in the static ground attitude.

(e) If provided as part of the engine, the applicant must show for each fluid injection (other than fuel) system and its controls that the flow of the injected fluid is adequately controlled.

[Doc. No. 3025, 29 FR 7453, June 10, 1964, as amended by Amdt. 33-10, 49 FR 6851, Feb. 23, 1984]

§ 33.37 Ignition system.

Each spark ignition engine must have a dual ignition system with at least two spark plugs for each cylinder and two separate electric circuits with separate sources of electrical energy, or have an ignition system of equivalent in-flight reliability.

§ 33.39 Lubrication system.

(a) The lubrication system of the engine must be designed and constructed